

## **CHAPTER 4**

### **CONCLUSIONS**

#### **The Stability of the Gut and Its Relationship to the Herring River**

- The continued stability of The Gut is dependent on the same two factors that governed its formation: 1) sand supply and 2) sea-level rise.
- The Gut influences the Herring River rather than vice versa as evidenced by:
  - The large meander or bend in the river that occurred as a result of The Gut's formation, that forced water to flow south through the harbor.
  - The existence of wide mudflat on either side of the main ebb channel present even before the dike was constructed, indicative of low ebb-flow velocities from the river.
- It is unlikely that The Gut would breach and form a permanent inlet due to the extensive marsh backing this barrier beach. If a large storm were to cause erosion along The Gut, a temporary washover may occur; however, natural post-storm rebuilding processes would quickly close it.
- Foot traffic across the dune system has worsened erosion and increased the possibility of a blowout. The Town of Wellfleet, Cape Cod National Seashore and volunteers are taking action to repair and limit this damage.

#### **Sedimentation in the Lower Herring River**

- Hydrodynamic models by Spaulding and Grilli in 2001 indicate that velocities above the dike, with all gates open, would be half that required to resuspend sediment.
- Calculations show that maximum flow velocities below the dike, with all gates open, will be just over a quarter (6 cm/sec) of the 20 cm/sec necessary to resuspend sediment.
- Geomorphic analysis of the intertidal area below the Herring River Dike shows almost no change over the past 155 years, with the exception of the formation of a small ebb- and larger flood-tidal delta. Otherwise, channel morphology below the present dike was the same before dike construction in 1909 as it is today; the dike has had little effect on downstream sedimentation.
- The predicted change in sedimentation, as a result of restoring tidal flow to the Herring River, would be minimal and proximal to the dike.
- Data from both the 1960s breach and from Hatches Harbor sedimentation not only support this prediction, but also indicate that the resulting changes around the dike will improve sedimentary conditions for shellfish repopulation.